

S. LAKE.

METHOD OF AND APPARATUS FOR CONSTRUCTING HULLS OF VESSELS.

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1,013,024.

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Fig. 1.

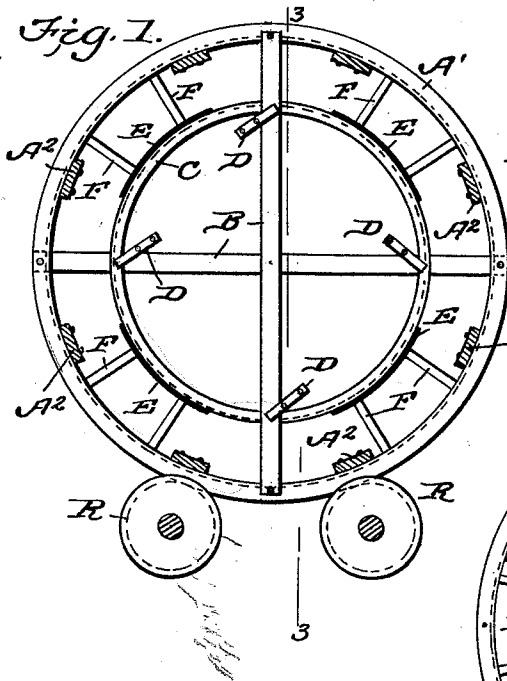


Fig. 4.

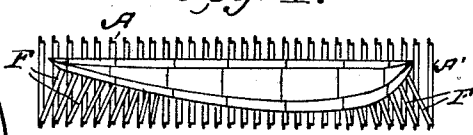


Fig. 2.

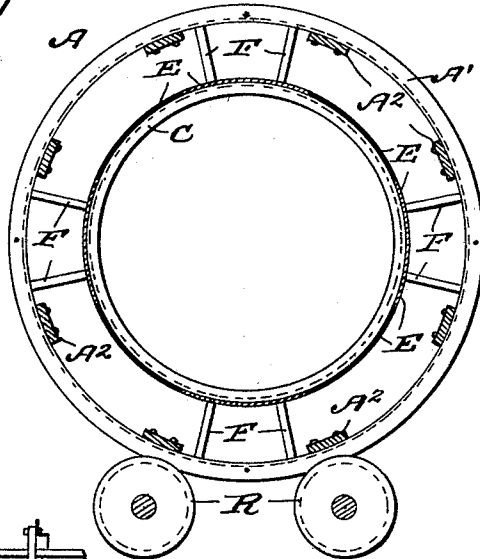
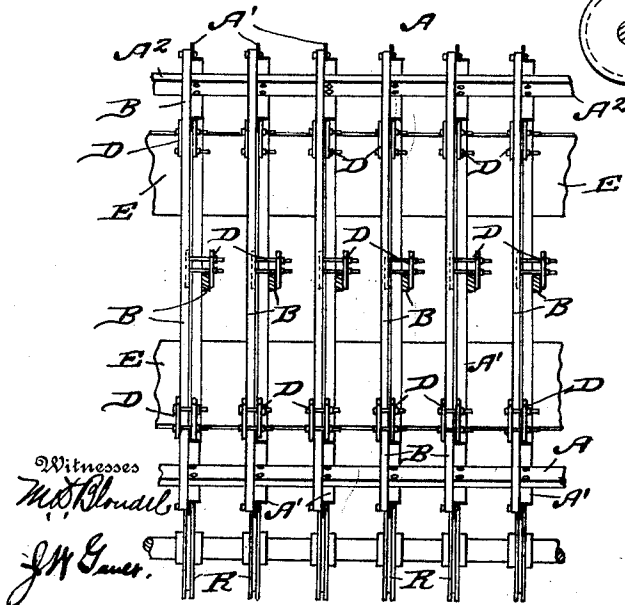


Fig. 3.



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METHOD OF AND APPARATUS FOR CONSTRUCTING HULLS OF VESSELS.

1,013,024.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SIMON LAKE, a citizen of the United States, residing at Milford, in the county of New Haven and State of Connecticut, have invented a new and useful Method of and Apparatus for Constructing Hulls of Vessels, of which the following is a specification.

The object of the invention is to provide an improved method of and apparatus for constructing hulls of vessels and particularly those of submarine and surface torpedo boats.

In the construction of submarine torpedo boats adapted for cruising in company with other war vessels designed for surface navigation only, it is of the greatest importance that the hulls be designed to afford the fine lines and light weight which are requisites in attaining high speeds, and that, at the same time, these hulls be constructed with the necessary strength to withstand the pressure incident to submergence. The method now followed in constructing such boats, is to lay the lower or keel plates in position, then arrange the ribs or frames of the hull upon the plates, and fasten them to said plates by means of rivets, and finally to arrange the remaining plates in position and rivet the plates to the ribs and to each other. This method is objectionable because it requires the riveting of the plates to the ribs and to each other, which weakens both the ribs and the plates, since a riveted joint is only about sixty per cent. of the strength of a plate; also because it requires the lapping of the plates and the calking of the seams; also because it necessitates the "fairing" of the seams in order to reduce the abutments formed by the edges of the overlapped plates; and also because it requires the filling in or "fairing" of the concavities or recesses formed in the plates by the bending of the plates from the lapped joints to the adjacent ribs, in order to provide a smooth even surface over the entire hull.

The invention consists in arranging the ribs or frames of the hull in position, then placing a portion of the plates end to end over the ribs or frames throughout practically the entire length of the hull, and welding the plates to the ribs, and welding their abutting edges to each other, and finally, in arranging the remaining plates in position and welding them to the ribs or frames, and welding their abutting edges

to each other and to the plates previously fastened in position.

The invention also consists in an outer, preferably skeleton, frame, of substantially circular shape in cross-section, for holding the ribs or frames in position while the first set of plates are being welded in place, and for holding the plates securely to the ribs or frames while they are being welded to said ribs or frames, said skeleton frame being so mounted that it may be revolved so as to bring the seams being welded in such position that the fluid metal resulting from the welding process may run down between the edges of the plates and between the plates and the abutting or contacting surfaces of the ribs or frames.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a diagrammatic vertical transverse section drawn through the amidships section of a submarine torpedo boat, illustrating the arrangement of the frames for holding the ribs or frames of the hull in position and the manner of arranging and holding the first set of plates to the ribs or frames while they are being welded to said ribs or frames. Fig. 2 is a similar view showing the rib or frame holding beams removed and the remaining plates in position over the exposed portions of the ribs and also the manner of holding the said plates to the ribs or frames. Fig. 3 is a vertical longitudinal section of the amidships section of the boat drawn on the line 3—3 of Fig. 1. Fig. 4 is a diagrammatic side elevation of a submarine torpedo boat arranged within the skeleton frame, the latter being shown in section, the boat illustrating one of the late types in which the upper portion or deck of the hull is arranged on a horizontal line.

In the practical application of my invention, I employ a skeleton frame A, of substantially cylindrical shape in cross-section, and constructed of a plurality of annular ribs or frames A', preferably L-shape in cross-section, which are connected by longitudinal beams A² bolted to the inner surfaces of the ribs or frames A', as shown. The frame A is mounted upon suitable rollers R, so that it may be conveniently revolved for the purpose hereinafter described. To the frame A are connected the ends of vertically and horizontally arranged beams

B, one set of such beams being arranged adjacent to each rib or frame C of the hull, to which they are bolted or connected by suitable clamps D to hold the ribs or frames C in perfect alinement. When the ribs or frames C have been thus assembled within the frame A, I arrange a portion of the plates E, that form the skin of the hull, over the ribs or frames C between the vertical and horizontal beams B throughout the entire length of the hull, and then clamp them firmly to said ribs or frames by means of struts or braces F which are interposed between the plates E and the ribs or frames A' of the skeleton frame A. After the plates E have been thus assembled, the plates at the lower or bottom section of the hull are welded to the ribs or frames C and end to end to each other by means of the oxyacetylene or other welding process. The frame A is then revolved so as to bring the side plates E, of either side of the hull, in position to lie under the ribs or frames C, at which time they are welded to the ribs or frames C and end to end to each other; and after these plates are so welded, the frame is further revolved and the ribs welded, as previously described, until all of the first sets of plates shall have been secured to the ribs and end to end to each other. After the first sets of plates have been welded together end to end and to the ribs C and thus held in position, the beams B are removed and the remaining plates then arranged over the uncovered portions of the ribs or frames C to which they are clamped in a manner similar to that described with reference to the plates first arranged over the ribs. These plates are then welded to the ribs, to each other end to end and to the abutting edges of the adjacent plates. After all of the plates have been welded in position, the outer frame A may be removed.

I propose to mount the frame A upon rollers R so that the frame may be conveniently revolved to permit of the joints between the plates and also between the ribs or frames of the hull and the plates being welded from the upper side which permits the fluid metal resulting from the welding process to run down into the joints and thus produce a perfect union of the metals.

It will thus be seen that by my invention I avoid the necessity of riveting the plates to the ribs thus effecting not only an economy in both time and labor but adding greatly to the strength of the hull, since a riveted joint is only about sixty per cent. of the body of a plate, whereas the welded joint is as strong as the plate itself. By welding the plates to the ribs I double the thickness of the metal, and likewise the strength at such points without adding to the weight of the hull. Furthermore, I avoid the necessity of lapping the plates, and of calking the

laps, and so provide a perfectly smooth surface, which is highly essential in attaining speed in submarine torpedo boats, where the engine and motor space is necessarily limited and the power for propelling this class of vessels is consequently restricted.

My invention will be found particularly applicable in the construction of comparatively small boats, especially submarine torpedo boats.

While I have shown and described my invention in connection with the construction of submarine torpedo boats, I do not desire it understood that I limit myself to this class of vessels, since the method and apparatus may be equally well carried out in the construction of metallic hulls of all classes of comparatively small vessels, especially those that are constructed of ribs or frames that are covered by shell platings.

What I claim is:—

1. The method of constructing hulls of vessels, which consists in properly locating the ribs of the hull, then arranging a portion of the plates forming the skin of the hull in position over the ribs and welding them to said ribs and end to end to each other throughout practically the entire length of the hull, and finally arranging the remaining plates in position and welding them to said ribs and welding their abutting ends to each other and their longitudinal edges to the abutting edges of the plates first welded in position.

2. The method of constructing hulls of vessels, which consists in properly locating the ribs of the hull and bracing them against displacement, then arranging a portion of the plates that form the skin of the hull over said ribs end to end between the braces throughout the entire length of the hull, and then welding said plates to said ribs and their abutting ends to each other, and finally arranging the remaining plates in position over the exposed portions of the ribs and welding them to said ribs, their abutting ends to each other, and their longitudinal edges to the abutting edges of the adjacent plates first welded in position.

3. The method of constructing hulls of vessels, which consists in properly locating the ribs of the hull within a suitable frame and bracing them to said frame, then arranging a portion of the plates that form the skin of the hull end to end between said braces throughout the entire length of the hull, and then welding said plates to said ribs and their abutting ends to each other, whereby the rib braces may be removed without displacing said ribs, and finally arranging the remaining plates in position and then welding them to said ribs, their abutting ends to each other and their longitudinal edges to the abutting edges to the plates first welded to the ribs.

4. The method of constructing hulls of vessels, which consists in arranging the ribs of the hull in a revoluble frame and bracing them to said frame by suitably spaced beams, then arranging between said beams a portion of the plates forming the skin of the hull end to end throughout practically the entire length of the hull, bracing the plates to said ribs transversely, then welding said plates to said ribs and their abutting ends to each other, whereby said rib bracing beams may be removed to permit the remaining hull plates being arranged in position, then removing said rib braces, and finally arranging the remaining plates over the uncovered portions of the ribs and welding them to said ribs and their abutting ends to each other and their longitudinal edges to the abutting edges of the plates first arranged in position.

5. Apparatus for use in constructing hulls of vessels, consisting of an outer frame within which the ribs of the hull are held, beams connecting said ribs to said frame to hold the said ribs in position, whereby the plates that form the skin of the hull may be arranged in position, and struts for holding

the said hull plates against displacement while said plates are being connected to said ribs and to each other.

6. Apparatus for use in constructing hulls of vessels, consisting of an outer skeleton frame of substantially circular form in cross-section, within which the ribs of the hull are held, beams connecting each rib to said skeleton frame for holding said ribs in position while a portion of the plates that form the skin of the vessel are arranged in position and secured to said ribs and to each other, struts for holding the plates in position while said plates are being secured to said ribs and to each other, whereby said rib holding beams may be removed, and rollers supporting said frame whereby said frame may be revolved to facilitate the connection of the plates as specified.

In testimony whereof I have hereunto set my hand this 17th day of September, A. D. 1910.

SIMON LAKE.

Witnesses:

JAMES W. GAULT,
M. D. BLONDEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."